

# BILLIE

Billie, the 9th typhoon of the season, was first observed on the morning of July 31st as a disturbance in the near equatorial trough approximately 180 nm northeast of Ponape. During the subsequent two days the system demonstrated little intensification as it moved toward the west-northwest at 14 kt. Throughout this period poor vertical stacking and unidirectional flow through the system in the 300 mb to 200 mb region hindered development.

On the evening of 2 August, meteorological satellite data indicated that the disturbance had turned toward the north and was becoming better organized. By the morning of the 3rd, the convective system had consolidated and had acquired strong banding from the northeast and southwest (Fig. 4-27). At 0000Z on the 3rd the disturbance was placed into warning status as TD 13 centered about 100 nm east of Guam. Ship reports at 0000Z indicated 30 knot surface winds and aircraft at 0052Z reported 40 kt flight level (700 mb) winds from the south, 20 nm east of the depression center.

By late morning on the 3rd, the northward movement of the tropical system had positioned it near the southern periphery of the mid-tropospheric subtropical ridge. In response, the tropical depression turned sharply toward the northwest in the direction of Saipan. Between 1700Z and 1800Z on the 3rd, TD 13 passed over Saipan where the 1800Z synoptic reports indicated southwesterly winds at 15 kt, a sea level pressure of

999.8 mb and a 6-hour rainfall of 3.86 inches. At 1800Z the depression was designated Tropical Storm Billie.

By 0000Z on the 4th the storm had intensified to 40 kt, and the northwestward track changed to a 4 kt southwestward track. Since the 3rd an intense low cell in the Tropical Upper Tropospheric Trough (TUTT) was slowly propagating southwestward toward the storm. By the 4th this low cell and its associated trough was applying considerable southward pressure on the anticyclone above Billie. By this time the upper, middle and lower components of the storm were strongly coupled and the entire storm moved southwestward with the anticyclone. Billie continued to slowly intensify as outflow in all but the northeast quadrant remained good.

During this period of erratic movement it appeared that Billie would be a threat to Guam. However, by the afternoon of the 5th the TUTT began to rapidly recede to the northwest. This affected the storm in two ways: (1) It relieved the southwestward pressure allowing the storm to acquire a westward and ultimately a northwestward track; and (2) It allowed the low cell within the TUTT to move north of Billie, restricting outflow and temporarily slowing the intensification rate. By the 6th, the upper low had moved considerably westward, eliminating its restricting influence on the tropical cyclone. Billie reacted by accelerating on a northwestward track and attaining typhoon intensity by 1800Z on the 5th (Fig. 4-28).

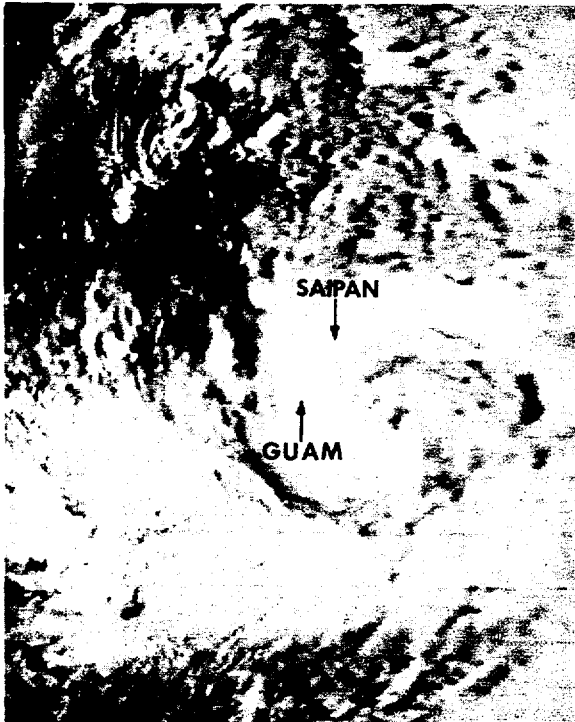


FIGURE 4-27. Billie during its early development at 30 kt intensity 100 nm east of Guam, 2 August 1976, 2155Z.



FIGURE 4-28. Billie at minimal typhoon intensity 275 nm northwest of Guam, 5 August 1976, 2118Z. [DMSP imagery]

During the subsequent 2 days Typhoon Billie continued its trek toward the north-west at 12 to 15 kt. Throughout this period outflow above the typhoon was unobstructed, allowing the system to intensify rapidly. From the night of the 6th until the morning of the 7th Billie underwent explosive deepening as an upper level trough west of the cyclone enhanced outflow in the northern semicircle and an unrestricted channel to the Southern Hemisphere subtropical jet stream enhanced outflow in the south semicircle. Reconnaissance aircraft at 1448Z on the 6th and at 0340Z on the 7th indicated that during this 13 hour period the eye temperature at 700 mb rose from 17°C to 26°C, and that the central pressure had fallen 46 mb, a rate more than 3.5 mb per hour. The 914 mb reported at 0350Z on the 7th was the minimum pressure attained by Billie. During this reconnaissance flight maximum surface winds were estimated to be 120 kt. At 0800Z on the 7th a ship, JPLY, reported southwesterly winds of 50 kt and a minimum sea level pressure 992.3 mb while located 70 nm south-southeast of the typhoon (Fig. 4-29). At 1200Z on the 7th Typhoon Billie reached its maximum intensity of 125 kt.

By the morning of the 8th the upper level trough, which had been located to the west of Billie, had been forced east of the typhoon by the rapid eastward expansion of a massive Asian upper level anticyclone. This upper level synoptic pattern exposed the region north of Billie to strong north-easterly flow which drastically reduced the outflow to the north and dictated a more westward movement for the tropical cyclone. This synoptic pattern persisted throughout the remainder of the storm's life, causing it to weaken and to move in a westward direction at 11 to 14 kt until it dissipated over mainland China.

By 0000Z on the 9th Billie had moved into the southern Ryukyu Islands. Fig. 4-30 illustrates surface observations from 0000Z through 1000Z on the 9th at the island stations of Miyako Jima (47927) and Ishigaki Shima (47918). Miyako Jima reported its lowest sea level pressure 964.4 mb at 0400Z while experiencing 44 kt sustained winds.

Two hours later Ishigaki Jima reported a pressure of 952.0 mb and northwesterly winds of 45 kt. At about 0700Z Typhoon Billie passed over the northern tip of Ishigaki Jima with maximum winds estimated at 95 kt,

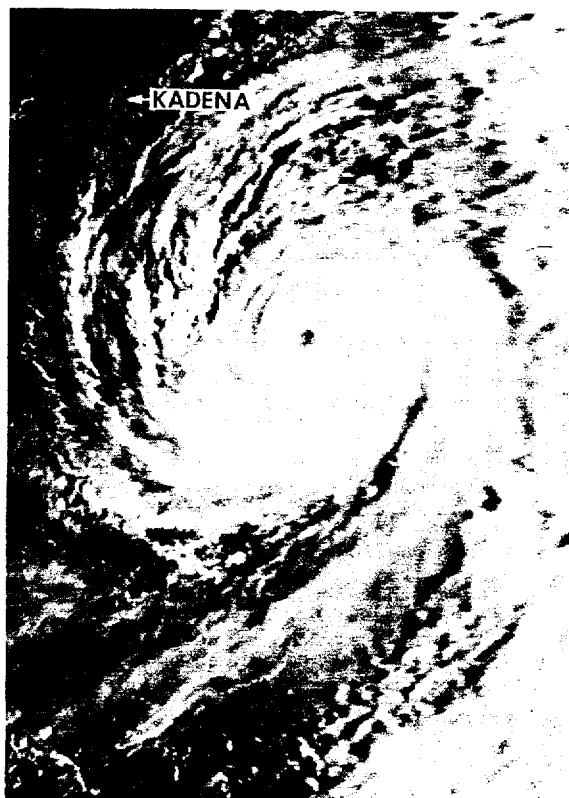


FIGURE 4-29. Typhoon Billie at 115 kt intensity 300 nm southeast of Kadena AB, Okinawa, 7 August 1976, 2236Z. (DMSP imagery)

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		09/00	09/01	09/02	09/03	09/04	09/05	09/06	09/07	09/08	09/09	09/10
47927 ROMY MIYAKUJIMA	<div style="display: flex; flex-direction: column; align-items: center;"> <div>27 3/4 654</div> <div>34 722</div> <div>26</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>27 4/4 655</div> <div>34 644</div> <div>26</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>27 6/8 7</div> <div>34 668</div> <div>26</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>27 6/8 8</div> <div>34 668</div> <div>26</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>27 6/4 644</div> <div>1 644</div> <div>26</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 6/8 665</div> <div>3 665</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 6/8 665</div> <div>3 665</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 7/25 725</div> <div>1/4 725</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 7/25 797</div> <div>1 797</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 8/4 841</div> <div>1/4 841</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>28 8/71 871</div> <div>1/2 871</div> <div>25</div> </div>	C
47918 ROIG ISHIGAKIJIMA	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div>26 3/4 833</div> <div>34 833</div> <div>25</div> </div>	C

FIGURE 4-30. Available synoptic surface observations at Miyako Jima and at Ishigaki Jima during the passage of Typhoon Billie.

and two hours later the island reported southwesterly winds of 91 kt with gust to 108 kt (Fig. 4-31). Newspaper reports stated that "huge waves south of Japan drowned 41 fisherman and swimmers along Japan's Pacific coast."

After its destructive whirl through the Ryukyus, Billie headed for Taipei traveling westward at 14 kt (Fig. 4-32). At 1200Z on the 9th, Penkiayu (46695) reported north-easterly winds of 77 kt. Taipei International Airport experienced 30 kt sustained winds with gusts to 65 kt, and a sea level pressure of 957.3 mb was observed at 1600Z; about one hour later the eye passed just south of Taipei.

Typhoon Billie exited Taiwan near Hsin-chu and moved toward the People's Republic of China on a west-northwestward track. By the morning of the 10th Billie had weakened into a tropical storm and slowed to 11 kt. At 0000Z on the 10th P'ing-t'an (58944) reported 60 kt winds from the north-northeast and a sea level pressure of 981.2 mb. About 0300Z Billie went ashore 25 nm southeast of P'ing-t'an. Within hours the storm had dissipated over the rugged terrain of eastern China.

Billie's passage over Taiwan was highly destructive (Fig. 4-33). Reports indicated 4 dead, 24 injured and 8 missing. Nearly 1000 homes were destroyed in the onslaught. Three ships were sunk and 7 others were severely damaged. Damage to power transmission facilities was estimated at \$2,630,000.

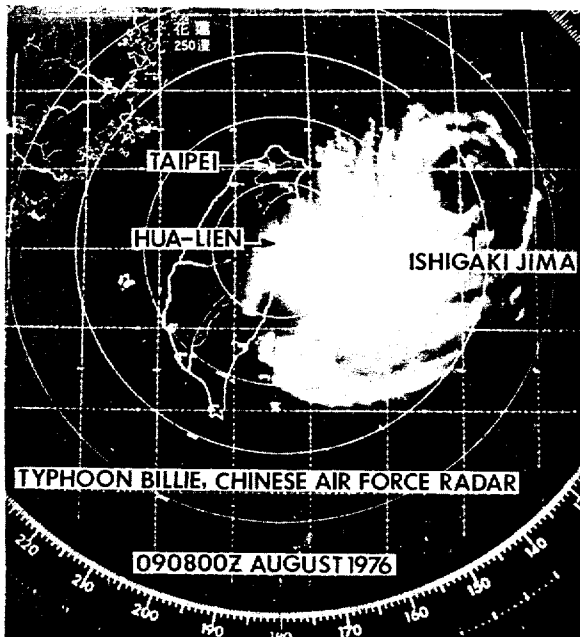


FIGURE 4-31. Radar presentation of Typhoon Billie as it pounds Ishigaki Jima with 90 kt winds, 150 nm east of Taipei, 9 August 1976, 0800Z. [Photograph courtesy of the Central Weather Bureau, Taipei, Taiwan, Republic of China.]

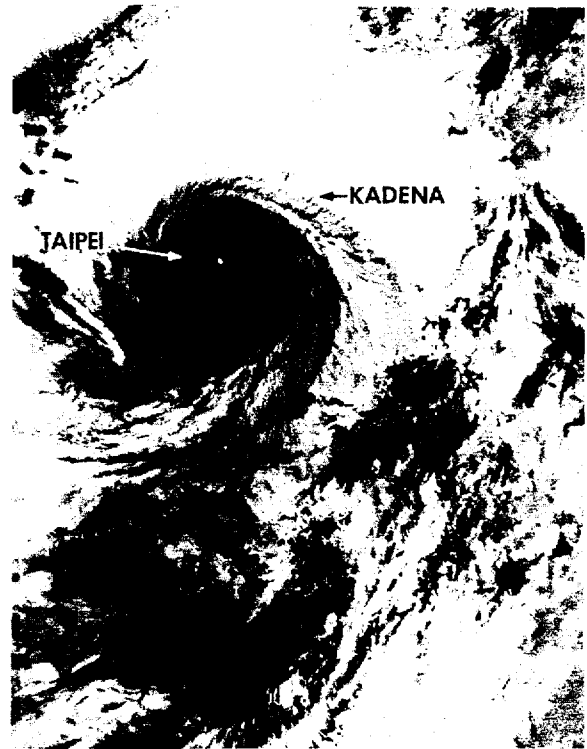


FIGURE 4-32. Infrared photograph of Typhoon Billie exiting the southern Ryukyu Islands with 90 kt intensity, 95 nm east of Taipei, 9 August 1976, 1109Z. (DMSP imagery)



FIGURE 4-33. Downtown Taipei after Typhoon Billie lashed the city with 75 kt winds. [Courtesy of Central Weather Bureau, Taipei, Taiwan, Republic of China.]